UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Northwest Region
7600 Sand Point Way N.E., Bldg. 1
Seattle, WA 98115

Refer to:
2002/01193

September 23, 2003

Mr. Lawrence C. Evans
U.S. Army Corps of Engineers
Attn: Karla Ellis
Regulatory Branch, CENWP-CO-GP
PO Box 2946
Portland, OR 97208-2946

Re: Endangered Species Act Formal Section 7 and Magnuson-Stevens Fishery Conservation and Management Act Essential Fish Habitat Consultation Request for the Joint Water Supply Intake Project, Upper Willamette River Basin, Santiam River, River Mile 11.5, Cities of Albany and Millersburg, Linn County, Oregon (Corps No. 200200720)

Dear Mr. Evans:

Enclosed is a biological opinion (Opinion) prepared by NOAA's National Marine Fisheries Service (NOAA Fisheries) pursuant to section 7 of the Endangered Species Act (ESA) on the effects of issuing a permit under section 404 of the Clean Water Act for construction of the proposed Albany-Millersburg Joint Water Supply Intake Project, in Linn County, Oregon. In this Opinion, NOAA Fisheries concludes that the proposed action is not likely to jeopardize the continued existence of ESA-listed Upper Willamette River (UWR) chinook salmon (*Oncorhynchus tshawytscha*) and steelhead (*O. mykiss*). As required by section 7 of the ESA, NOAA Fisheries also includes reasonable and prudent measures with nondiscretionary terms and conditions that NOAA Fisheries believes are necessary to minimize the impact of incidental take associated with this action.

NOAA Fisheries is unable to provide incidental take authorization for the Albany-Santiam Canal Diversion because the analysis of effect is incomplete. The existing diversion is part of the Canal operations for which a new section 7 consultation will be required in accordance with the Federal Energy Regulatory Commission's requirements for fish passage improvements.

This document also serves as consultation on essential fish habitat pursuant to section 305(b) of the Magnuson-Stevens Fishery Conservation and Management Act and implementing regulations at 50 CFR Part 600.

If you have any questions regarding this consultation, please contact Anne Mullan of my staff in the Oregon Habitat Branch at 503.231.6267.

Sincerely,

Russell M Strach for

D. Robert Lohn
Regional Administrator

cc: Steve Mamoyac, ODFW
Craig Massie, CH2M HILL
Diane Taniguchi-Dennis, City of Albany
Clayton Wood, Mayor, City of Millersburg
Mim Swartz, Oregon Economic and Community Development Department

Endangered Species Act - Section 7 Consultation
Biological Opinion

&

Magnuson-Stevens Fishery Conservation and Management Act
Essential Fish Habitat Consultation

Albany and Millersburg Joint Water Supply Intake Project,
Santiam River, Linn County, Oregon
(Corps No. 200200720)

Agency:	U.S. Army Corps of Engineers
Consultation Conducted By:	NOAA's National Marine Fisheries Service, Northwest Region
Date Issued:	September 23, 2003
Issued by:	Russell M Strach for D. Robert Lohn Regional Administrator
Refer to:	**2002/01193**

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1. INTRODUCTION

1.1 Consultation History

On October 1, 2002, NOAA's National Marine Fisheries Service (NOAA Fisheries) received a biological assessment (BA) from the U.S. Army Corps of Engineers (COE) and a written request for concurrence with a finding that the project is "not likely to adversely affect" (NLAA) the Upper Willamette River (UWR) chinook salmon (*Oncorhynchus tshawytscha*) and steelhead (*O. mykiss*) evolutionarily significant units (ESUs). On January 13, 2003, NOAA Fisheries sent a letter of nonconcurrence and request for additional information to the COE. On March 4, 2003, NOAA Fisheries received a letter stating the project was likely to adversely affect UWR chinook and steelhead, and requesting formal consultation for the project, and also received further information on the project from CH2M HILL in March and July 2003.

This consultation is undertaken pursuant to section 7(a)(2) of the ESA and its implementing regulations, 50 CFR Part 402. UWR chinook salmon were listed as threatened under the ESA by NOAA Fisheries on March 24, 1999 (64 FR 14308). UWR steelhead were listed as threatened under the ESA by NOAA Fisheries on March 25, 1999 (64 FR 14517). Protective regulations for both species were issued under section 4(d) of the ESA on July 10, 2000 (65 FR 42422). Additional references and biological information are available in Busby *et al.* 1996, Myers *et al.*1998, and Healey 1991.

The analysis also fulfills the essential fish habitat (EFH) requirements under the Magnuson-Stevens Fishery Conservation and Management Act (MSA). The MSA, as amended by the Sustainable Fisheries Act of 1996 (Public Law 104-267), established procedures designed to identify, conserve, and enhance EFH for those species regulated under a Federal fisheries management plan. Federal agencies must consult with NOAA Fisheries on all actions, or proposed actions, authorized, funded, or undertaken by the agency, that may adversely affect EFH (§305(b)(2)).

1.2 Proposed Action

The COE proposes to issue a permit under section 404 of the Clean Water Act to the City of Albany and the City of Millersburg for the construction of a joint water supply intake on the Santiam River, approximately 500 feet downstream from the confluence of the North and South Santiam Rivers, at approximately river mile (RM) 11.5.

1.2.1 Expanded Water Supply

The purpose of the proposed action is to provide an expanded water supply system to the two cities. The new intake would initially have capacity of 20 cubic feet per second (cfs) by 2005, to meet demand through 2015. Ultimately the operations will allow for an expansion to a capacity of 31 cfs, for projected needs by 2075. Capacity for the existing Albany treatment plant is 31 cfs, which currently provides water to both communities. To accomplish the action, the City of

Albany is proposing to change the point of diversion for some of their water rights from the Albany-Santiam Canal at RM 20.8 on the South Santiam to the new intake on the Santiam River, with the option of reverting to the existing point of diversion.

Any withdrawal of flows that would impair habitat conditions in the South Santiam River is a habitat-modifying activity that may harm listed species and therefore may be considered "take" under the ESA.[1] However, because instream flows would continue to be withdrawn at levels comparable to those shown in Table 1 for 2005 from the existing facility, whether or not the new intake is constructed, NOAA Fisheries does not consider any take associated with expanded withdrawals as incidental to the proposed action. Therefore, compliance with this Opinion's terms and conditions will not remove the prohibition against take due to any instream flows withdrawn from the existing Albany-Santiam Canal.

The point of diversion of the existing Albany water intake relies on the unscreened Albany-Santiam canal, and this is proposed for use as an alternative supply when the new joint water project intake is completed. Screening and improvements to the diversion dam on the South Santiam are currently in the early design stage. Consultation for construction of these improvements is anticipated to follow the Joint Water Supply Intake Project (hereafter, intake project). The new intake will provide water for the full demands during modifications to the existing intake (Attachment 1 in January 21, 2003, letter from Craig Massie, CH2M HILL submitted with February 26, 2003, COE consultation request letter).

The intake project screen and pipelines are sized to meet future demands up to the 40.2 cfs capacity, although pumps will not be installed at the higher capacity initially. Pumps for the projected initial withdrawals of 18.6 cfs will be installed as described in the BA (CH2M HILL 2002). The effects of the expanded withdrawals are not covered in this Opinion, because the project to screen the Albany-Santiam Canal will require separate consultation, for which analysis of the effects from the combined withdrawals from the canal and the current project intake will be required. The total screen area is larger than required to meet the approach velocity criteria for the maximum 40.2 cfs withdrawals, but since the screen spacing is close, the extra margin will allow better functioning and improved cleaning.

The average combined cities' initial demands in 2005 were projected during summer months as 11 to 20 cfs, with peak daily demands of 15 to 26 cfs, as shown in Table 1. These are expected to grow by 2015, such that the existing Albany intake upstream on the Albany-Santiam Canal will be required to supplement peak demands. In the projected final buildout to 2075, the summer average and peak demands will require both the existing and the proposed plant to operate at nearly full capacity (62 cfs).

[1] See, 64 FR 60727 (November 8, 1999) (defining 'harm' as an element of 'take' in the ESA, citing removing water or otherwise altering streamflow when it significantly impairs spawning, migration, feeding or other essential behavioral patterns as an example), and 65 FR 42522 (July 10, 2000) (applying take prohibition to threatened species).

Municipal water returned to the Albany Wastewater Collection System is treated and discharged to the Willamette River below Cox Creek at RM 118, upstream from the Santiam River confluence at RM 108.

Table 1. The Monthly Average and Peak Daily Demand Projected Withdrawals, and Capacity in the Initial Plant by 2005, and the Final Build-out by 2075. (Source: Attachment 3, CH2M HILL 2003)

Average Projected Daily Withdrawals (cfs)						Initial capacity	Design capacity
	2005	2015	2025	2050	2075		
January	10	12	14	20	28	15	23
February	11	12	14	21	28	15	23
March	11	12	14	20	28	15	23
April	11	12	14	20	28	15	23
May	11	13	15	22	30	15	23
June	16	18	22	31	43	25	31
July	20	23	27	39	54	25	31
August	20	22	26	38	52	25	31
Sept	15	17	19	28	39	25	31
October	12	14	16	23	32	15	23
November	11	12	15	21	29	15	23
December	10	12	14	20	27	15	23
Peak Projected Daily Withdrawal (cfs)							
January	12	13	15	21	28	15	23
February	11	13	14	20	27	15	23
March	13	14	16	22	30	15	23
April	12	13	16	22	29	15	23
May	15	17	19	27	37	15	23
June	25	27	31	44	59	25	31
July	26	29	33	46	62	25	31
August	26	29	33	46	62	25	31
Sept	18	20	23	32	44	25	31
October	16	17	20	27	37	15	23
November	13	14	16	23	30	15	23
December	13	14	17	23	31	15	23

1.2.2 Intake Structure

The proposed location for the intake is 500 feet downstream of the confluence of the North and South Santiam Rivers with the mainstem Santiam River. Aerial photographs from June 1948, summer 1955, May 1963, and August 1970 were reviewed by the project applicant's consultant, and show the location having a stable bank, with some photos showing a migrating sandbar downstream. Photos of the confluence area of the North and South Santiam Rivers with the Santiam River show various channels and an occasionally exposed gravel bar upstream of the site.

The intake structure will have four pairs of profile bar screens from Hendrick Screens arrayed parallel to the bank, approximately 50 feet from the shoreline. The description received with the request for formal consultation is as follows:

> "The raw water intake consists of a 17-foot by 24-foot rectangular structure embedded in the river bed and equipped with pre-manufactured fish screens and an air backflush system to clean the screens. Eight semi-circular screens, 24-inches in diameter with 0.069 inch slot openings, will be located on top of the structure. The screens will extend approximately 18-inches above the river bed for the length of intake structure. The intake structure incorporates the collection piping assembly, located just off shore in the bedrock river bottom [with] two 42-inch gravity conveyance pipelines [that] will run parallel to the shoreline to a point where they can cross the shoreline riparian zone with minimal disruption" (CH2M HILL 2003, Attachment 4).

The project components in the river include the intake structure and 400 feet of dual 42-inch diameter pipe buried in the downstream gravel bar. An additional dual 42-inch diameter pipe will run from the river bed upland to the raw water pump station. The intake requires approximately 88 cubic yards (cy) of excavation that will be filled with the screens and pipeline, then covered with native materials. Additionally, the pipeline will require 2,208 cy of excavation, with the pipes embedded in riverbed materials or backfilled with concrete where the river bed is bedrock. The raw water pump station, filtration plant, finished water reservoir, and backwash ponds are on upland sites.

The intake structure construction will implement measures for flow diversion around the work areas, and limit turbidity increases to less than 10% above natural water turbidity. The gravel beside the intake site and coffer dams will be used to isolate the work area from the active flowing stream. Instream equipment operation will be minimized, and equipment will be kept out of flowing water and confined to the minimum area in wetlands to perform the work. Waste materials and spoils, except salvaged topsoil, shall be placed outside of wetlands and waters, and non-native materials will be removed from work areas after project completion.

Screen inspection and maintenance operations will include cleaning with a pressurized air burst system, with an air burst compressor and air receiver mounted in the raw water pump station building. Periodic removal of organic material or any debris on the screens will be performed during inspections.

1.2.3 Transmission Pipeline

From the raw water pump station near the Santiam River, the distance to the water treatment plant on Scravel Hill, east of Millersburg and Interstate 5 is approximately 2,950 feet. The pipeline delivering raw water to this plant crosses Crooks Creek and an unnamed intermittent tributary. The distance the treated water travels to Albany and Millersburg is about 24,000 feet. The pipeline crosses Crooks Creek, Murder Creek, Church Creek, Truax Creek, Burkhart Creek,

and an unnamed creek near Adah Avenue in the City of Albany. All are tributaries to the Willamette River north of Albany, with crossing methods for each shown in Table 2.

Table 2. Creek-Crossing Methods for Water Delivery Pipelines.

Creek	Crossing Method	Notes
Crooks Creek	open cut	seasonal drainage channel
Unnamed tributary to Crooks Creek	culvert and fill	allows access to upland tract
Murder Creek	boring	
Church Creek	in existing 12-inch concrete culvert	under Century Drive
Truax Creek	in an existing large box culvert	under Century Drive
Burkhart Creek	boring	
Unnamed creek near Adah Ave	no crossing	pipe under paved roadway

1.2.4 Backwash System

The plant treatment system uses membrane filtration followed by chlorination. Raw Santiam River water will be used to backwash the membrane filters in the treatment system to remove accumulated particles. The waste stream of concentrated particulate matter from the source water will be discharged to backwash settling pools in an upland location, where it will be retained for a minimum of 30 minutes to settle solids, then conveyed via a pipeline in the same trench as the raw water pipeline to the intake screen site, at a rate not exceeding 1.3 mgd (2 cfs). The facilities provided are the neutralization basin, recirculation/transfer pumps, neutralization chemical feed systems, and plant controls and instrumentation (analyzers). The system was described as follows (July 21, 2003 letter from Craig Massie, CH2M HILL): The membranes are periodically cleaned with citric acid and chlorine solution (sodium hypochlorite) to avoid clogging the membranes. The citric acid cleaning intervals will be approximately monthly, and the chlorine cleanings are likely to be daily. The spent cleaning solutions will be contained and neutralized onsite before discharge. The neutralization steps are as follows:

1. The spent cleaning solution is discharged within the neutralization basin.
2. The recirculation pumps begin recirculating the spent cleaning solution while the neutralization chemical is added. For a citric acid cleaning, sodium hydroxide (caustic) is added to neutralize to a target pH. For a chlorine cleaning, sodium bisulfite is added to react with and deplete the residual chlorine. The target pH will be 7.0 and the target chlorine residual will be 0.0 mg/l free chlorine.

3. The recirculation piping is continuously sampled and monitored for pH and chlorine residual. Once the effectiveness of the neutralization treatment is verified through these online analyzers, the neutralized wastewater will be discharged to the settling basins.
4. The neutralized cleaning solution is blended with the "normal" filter backwash wastewater. The normal backwash wastewater will be chemically equivalent to the Santiam River raw water. The volume of spent cleaning solution is small compared to the volume of normal backwash wastewater. For the phase 1 plant maximum summertime daily production of 26 cfs [16.5 mgd], the daily backwash volume will be approximately 825,000 gallons, and the neutralized cleaning solution for the same 24-hour operating period will be approximately 18,000 gals, or about 2% of the total wastewater volume.
5. The supernatant (settled water) from the settling basins is decanted and returned to the Santiam River.

With the controls provided, target pH and chlorine residual can be achieved. The 6.0 to 9.0 pH range is the allowable range in the general 200-j NPDES permit, for water treatment plant discharges.

2. ENDANGERED SPECIES ACT

2.1 Biological Opinion

Individual and North and South Santiam populations of the UWR spring chinook and UWR steelhead ESUs complete a substantial part of their freshwater life history requirements in the proposed action area, as it is a migration and rearing reach for both populations. In addition, the North Santiam UWR spring chinook and steelhead have spawning habitat just above the confluence. The timing of the life history stages is shown in Table 3.

2.1.1 Biological Information

For the past year, NOAA Fisheries has been working with state, tribal and other Federal biologists to develop the updated information and analyses needed to re-evaluate the status of the Pacific salmon and steelhead ESUs. NOAA Fisheries' Biological Review Team (BRT) for Pacific salmon and steelhead met in 2003 to review this updated information, and reported preliminary findings about the status of each ESU. The results of that review are included in the "Draft Report of Updated Status of Listed ESUs of Salmon and Steelhead".[2]

[2] This draft report is available online at http://www.nwfsc.noaa.gov/trt/brt/brtrpt.cfm.

Table 3. UWR Spring Chinook and Winter Steelhead Salmon Life History Timing. Light Shading Represents Low-level Abundance, Dark Shading Represents Peak Abundance (after USACE *et al*. 2000)

Life history stage	Species	J	F	M	A	M	J	J	A	S	O	N	D
Upstream migration	Spr Chinook												
	Wtr Steelhead												
Spawning in tributaries	Spr Chinook												
	Wtr Steelhead												
Intragravel Development	Spr Chinook												
	Wtr Steelhead												
Juvenile Rearing	Spr Chinook												
	Wtr Steelhead												
Juvenile Out-migration	Spr Chinook												
	Wtr Steelhead												

The status review updates were undertaken to allow consideration of new data that have accumulated since the last updates and to address issues raised in recent court cases regarding the ESA status of hatchery fish and resident (nonanadromous) populations. In some ESUs, adult returns of some populations over the last 1-3 years have been significantly higher than have been observed in the recent past. The BRT found these results, which affected the overall BRT conclusions for some ESUs, to be encouraging. This change reflects the larger adult returns over the past several years, which nevertheless remain well below preliminary targets for ESA recovery. Overall, although recent increases in escapement were considered a favorable sign by the BRT, the response was uneven across ESUs and sometimes across populations within ESUs. The UWR steelhead ESU was among the lowest scoring of all west coast steelhead ESUs. The BRT noted that recent increases have not yet been sustained for a full salmon/steelhead generation and the causes for the increases are not well understood. In many cases, they may be due primarily to unusually favorable conditions in the marine environment rather than alleviation of the factors that led to widespread declines in abundance. Overall, the BRT felt that ESUs and populations would have to maintain themselves for a longer time at levels considered viable before it could be concluded that they are not at significant continuing risk.

These preliminary findings focus solely on the naturally-spawning portion of each ESU, and do not take into account the future effects of ongoing salmon conservation and recovery efforts. For the UWR spring chinook and winter steelhead ESUs considered in this Opinion, the majority BRT conclusion was that they were "likely to become endangered in the foreseeable future". A

summary of findings for the UWR spring chinook and winter steelhead ESUs is at the end of the following ESU-specific sections.

UWR Spring Chinook

The UWR chinook salmon ESU includes native spring-run populations above Willamette Falls and in the Clackamas River. In the past, it included sizable numbers of spawning salmon in the Santiam River, the Middle Fork of the Willamette River, and the McKenzie River, as well as smaller numbers in the Molalla River, Calapooia River, and Albiqua Creek. The total run sizes reported for UWR spring chinook since 1970 have ranged from 30,000 to 130,000, with the 2000-2002 runs in the range of 60,000 to 80,000. In 2002, fishery counts showed a rate of 77% for marked fish through June. Hence, approximately 23% of the 2002 estimated run size of 121,700 results or approximately 28,000 returning adults were natural spawners in the Willamette basin (ODFW 2003). Marking of hatchery releases with an adipose fin clip reached 100%, beginning with those released in 1998 (S. King, ODFW, personal communication with A. Mullan, NOAA Fisheries, 28 October 2002, email).

Fish in this ESU are distinct from those of adjacent ESUs in life history and marine distribution. The life history of chinook salmon in the UWR ESU includes traits from both ocean- and stream-type development strategies. Coded wire tag recoveries indicate that the fish travel to the marine waters off British Columbia and Alaska. More Willamette fish are recovered in Alaskan waters than fish from the Lower Columbia River ESU. UWR chinook salmon mature in their fourth or fifth years. Historically, 5-year-old fish dominated the spawning migration runs, but recently, most fish have matured at age 4. The timing of the spawning migration is limited by Willamette Falls. High flows in the spring allow access to the upper Willamette basin, whereas low flows in the summer and autumn prevent later-migrating fish from ascending the falls. The low flows serve as an isolating mechanism, separating this ESU from others nearby.

Hatchery production in the basin began in the late nineteenth century. Eggs were transported throughout the basin, resulting in current populations that are relatively homogeneous genetically, although still distinct from those of surrounding ESUs. Hatchery production continues in the Willamette River, with an average of 8.4 million smolts and fingerlings released each year into the main river or its tributaries between 1975 and 1994. Hatcheries are currently responsible for 90% of escapement in the basin.

Harvest on this ESU is high, both in the ocean and in river. The total in river harvest below the falls from 1991 through 1995 averaged 33%, and was much higher before 1991. Ocean harvest was estimated as between 19-33% since 1982. ODFW (1998) indicated that total marine and freshwater harvest rates on UWR spring-run stocks were reduced considerably for the 1991 through 1993 brood years, to an average of 21%. Before full marking of hatchery fish with an adipose fin clip, harvest occurred on both wild and hatchery fish. Present regulations allow only marked fish to be retained.

The BRT (2003) updated the status of listed chinook salmon ESUs, using recent spawner abundance and hatchery fractions from marking studies. The BRT reviewed data of historical

spring chinook populations including the Clackamas, Mollala, North Santiam, South Santiam, Calapooia, McKenzie, and Middle Fork Willamette Rivers. While lacking an assessment of the ratio of hatchery-origin to wild-origin chinook passing the falls, hatchery-origin fish were described as dominating the runs. They define natural-origin fish as having parents that spawned in the wild, as opposed to hatchery-origin fish whose parents spawned in a hatchery (BRT 2003).

The BRT reviewed data for the North Santiam and found natural-origin spawners were greatly outnumbered by hatchery origin spawners, resulting in an estimated 94% hatchery-origin spawners in 2000 and 98% in 2001. This led the BRT to consider the population as not self-sustaining, although it was recognized as one of seven historical spring chinook populations. The basis for a large number of spring chinook released in the Upper Willamette is for mitigation for the loss of habitat above Federal hydroprojects. While harvest retention is only allowed for hatchery marked fish, take of natural spawners from hooking mortality and non-compliance also occurs. Overall, the hatchery production is considered a potential risk, because it masks the productivity of natural population, inter-breeding between hatchery and natural fish poses potential genetic risks and the incidental take from the fishery promoted by the hatchery production can increase adult mortality.

For the UWR chinook salmon ESU as a whole, NOAA Fisheries estimates that the median population growth rate (lambda) over the base period ranges from 1.01 to 0.63, decreasing as the effectiveness of hatchery fish spawning in the wild increases compared to that of fish of wild origin (Tables B-2a and B-2b in McClure *et al.* 2000).

UWR Winter Steelhead

The UWR steelhead ESU occupies the Willamette River and tributaries upstream of Willamette Falls, extending to and including the Calapooia River. These major river basins containing spawning and rearing habitat comprise more than 12,000 square kilometers in Oregon. Rivers that contain naturally-spawning, winter-run steelhead include the Tualatin, Molalla, Santiam, Calapooia, Yamhill, Rickreall, Luckiamute, and Mary's Rivers. Early migrating winter and summer steelhead have been introduced into the upper Willamette basin, but those components are not part of the ESU. Native winter steelhead within this ESU have been declining since 1971, and have exhibited large fluctuations in abundance.

Native steelhead of the upper Willamette basin are primarily late-migrating winter steelhead, entering freshwater primarily in March and April. This atypical run timing appears to be an adaptation for ascending Willamette Falls, which functions as an isolating mechanism for UWR steelhead. Reproductive isolation resulting from the falls may explain the genetic distinction between steelhead from the upper Willamette basin and those in the lower river. UWR late-migrating steelhead are ocean-maturing fish. Most return at age four, with a small proportion returning as 5-year-olds (Busby *et al.* 1996).

Willamette Falls (RM 26) is a known migration barrier. Winter steelhead and spring chinook salmon historically occurred above the falls, whereas summer steelhead, fall chinook, and coho

salmon did not. Detroit and Big Cliff Dams cut off 540 kilometers of spawning and rearing habitat in the North Santiam River. In general, habitat in this ESU has become substantially simplified since the 1800's by removal of large woody debris to increase the river's navigability.

Spawning takes place from April through the first of June, similar to historical conditions. Because spawning takes place primarily in May, it is separated in time from that of UWR chinook salmon which takes place primarily in September. Some spatial separation also occurs because UWR steelhead typically spawn in smaller streams than UWR chinook salmon. Thompson *et al.* (1966) estimated that the North Santiam subbasin supported a population of 3,500 UWR steelhead in the 1950s and 1960s, including adults trapped at Minto Dam. A winter-run hatchery stock, developed primarily from North Santiam wild fish but with some fish from the Big Creek and Klaskanine River stocks, was released into the Santiam subbasin beginning in 1952.

The main hatchery production of native (late-run) winter steelhead occurred in the North Fork Santiam River, where estimates of hatchery proportions in natural spawning areas ranged from 14% to 54% (Busby *et al.* 1996). ODFW (1990) released approximately 100,000 steelhead smolts each year, mostly into the mainstem North Santiam River and Big Cliff Reservoir. Traps installed at Stayton in the North Santiam River in 1993 and 1994 caught 42% and 85%, respectively, marked winter steelhead (Kostow 1995). Hatchery strays from outside the system represented 2% of the catch in both years, and the remainder were North Santiam stock hatchery fish. Beginning with releases in 1990, 100% were marked. Estimates of the percentage of naturally-spawning fish attributable to hatcheries in the late 1990s were 17% in the North Santiam (Chilcote 1997). Steelhead smolt releases stopped after 1998, and the last groups' three-year-old spawners returned in 2001, four-year-olds in 2002 (W. Hunt, ODFW, personal communication with A. Mullan, NOAA Fisheries, 28 October 2002 email).

The West Coast Steelhead BRT met in January 2003, to determine if new information or data warranted any modification of the conclusions of the original BRTs. They focused primarily on information for anadromous populations in the risk assessments for steelhead ESUs, but considered the presence of relatively numerous, native resident fish as a mitigating risk factor for some ESUs. Their draft report (BRT 2003) summarizes new information and the preliminary BRT conclusions on the UWR winter steelhead ESU and nine other ESUs.

Their draft report noted that after a decade in which Willamette Falls counts were near the lowest levels on record, adult returns for 2001 and 2002 were up significantly. Yet the total abundance is small for the entire ESU with a recent mean of less than 6,000, and many populations at relatively low levels. Most of the populations are in decline over the period of the available time series. Given that the BRT could not conclusively identify a single naturally self-sustaining population, it is uncertain whether recent increases can be sustained. The discontinuation of the releases of the "early" winter-run hatchery population[3] was described as positive, but continued

[3] The last years of releases were 1998 on the North Santiam and 1989 on the South Santiam.

releases of non-native summer steelhead are cause for concern, and the available time series are confounded by the presence of hatchery-origin spawners.

On the South Santiam, the BRT noted abundance of natural origin winter steelhead was between 239 and 496 spawners for data years 1967-2002 at Foster Dam (RM 38). On the North Santiam, the range reported was from 79 to 895 for data years 1960-2000 at the ODFW Minto Trap facility (RM 56).

For the UWR steelhead ESU as a whole, NOAA Fisheries estimates that the median population growth rate (lambda) over the base period ranges from 0.94 to 0.87, decreasing as the effectiveness of hatchery fish spawning in the wild increases compared to that of fish of wild origin (Tables B-2a and B-2b in McClure *et al.* 2000).

2.1.2 Evaluating Proposed Actions

An action area is defined by NOAA Fisheries regulations (50 CFR 402.02) as "all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action." Direct effects occur at the project site and may extend upstream or downstream based on the potential for impairing fish passage, hydraulics, sediment and pollutant discharge, and the extent of riparian habitat modifications. Indirect effects may occur throughout the watershed where actions described in this Opinion lead to additional activities or affect ecological functions, contributing to habitat degradation. Thus, the action area is defined as that bankline, riparian area, and aquatic habitat affected by the proposed action. For this consultation, the action area includes the bankline, riparian area, and aquatic habitat in the vicinity of the proposed intake on the Santiam River, and the instream wetted area downstream from the proposed intake to the confluence with the Willamette River.

2.1.2.1 Biological Requirements

The first step in the methods NOAA Fisheries uses for applying the ESA section 7(a)(2) to listed salmon is to define the species' biological requirements that are most relevant to each consultation. NOAA Fisheries also considers the current status of the listed species, taking into account population size, trends, distribution and genetic diversity.

The relevant biological requirements are those necessary for the subject species to survive and recover to a naturally-reproducing population level, at which time protection under the ESA would become unnecessary. Adequate population levels must safeguard the genetic diversity of the listed stock, enhance its capacity to adapt to various environmental conditions, and allow it to become self-sustaining in the natural environment.

For actions that affect freshwater habitat, NOAA Fisheries usually describes the habitat portion of a species' biological requirements in terms of a concept called properly functioning condition (PFC). PFC is defined as the sustained presence of natural habitat-forming processes in a watershed that are necessary for the long-term survival of the species through the full range of

environmental variation (NMFS 1999). PFC, then, constitutes the habitat component of a species' biological requirements. UWR steelhead and chinook salmon survival in the wild depends upon the proper functioning of ecosystem processes, including habitat formation and maintenance. Restoring functional habitats depends largely on allowing natural processes to increase their ecological function, while at the same time removing adverse effects of current practices. For this consultation, the biological requirements are improved habitat characteristics that would function to support successful adult migration and juvenile over-winter rearing, and spring out-migration. The current status of the indicated fish species, based upon their risk of extinction, has not significantly improved since the species were listed.

Essential elements for salmonids are: Substrate, water quality, water quantity, water temperature, water velocity, cover/shelter, food (juvenile only), riparian vegetation, space, and safe passage conditions. Based on migratory and other life history timing, it is likely that both adult and juvenile life stages are present in the action area when activities would be carried out. Actions authorized by the proposed project may affect water quality, water temperature, water velocity, and safe passage.

2.1.2.2 Environmental Baseline

The COE's Big Cliff and Detroit Dams upstream on the North Santiam River block passage to 38 miles of habitat and passage to tributaries. The Minto fish weir, two miles below Big Cliff Dam also restricts upstream passage. Downstream from the Big Cliff Dam, the North Santiam has 47 miles of potential fish habitat. At the Minto facility, ODFW sorts marked hatchery fish from wild fish, and returns some of the hatchery fish to sites downstream for recreational fisheries. Unmarked fish are returned to the river, either immediately above the weir, or in some cases into the Little North Santiam River, the largest tributary below the COE dams. Chinook fry are released into Detroit Reservoir where they contribute to the sport fishery. It is unknown whether this population contributes to runs below the dams.

Before construction of Detroit and Big Cliff Dams, peak flows in the North Santiam greater than 40,000 cfs were not uncommon. Since completion of the existing COE flood control projects, unregulated inflows from tributaries such as the Little North Santiam River continue to produce flood events comparable to all but the largest pre-dam flows. Flows as high as 67,200 cfs have been recorded at the Mehama gage, but the two-year recurrence interval event has decreased from approximately 34,200 cfs to 19,700 cfs. Since construction of Detroit and Big Cliff Dams, no flows lower than 682 cfs have been recorded at the Mehama gage, and the average daily flow in August has increased to 1,310 cfs (Moffatt *et al.* 1990). Some post-project summer flows are greater than occurred historically, because storage is available at COE facilities to redistribute flood volumes and release water later in the year for flow augmentation purposes.

The North Santiam River is 303d-listed for temperature in both time periods checked by Oregon Department of Environmental Quality (ODEQ) (2002). Their data showed that 39% of summer values exceeded the temperature standard (17.8°C), with exceedences annually and a maximum of 22°C in water years 1986-1995. For the spawning season criteria of 12.8°C, 12 days in the

period September 1999- June 2000 had temperatures exceeding the criteria (ODEQ 2002). In draft guidance for temperature water quality standards, the EPA listed adult migration lethal temperatures as 21-22°C for one week constant exposure, with elevated disease at constant temperatures 14-17°C, and an overall reduction in migration fitness due to cumulative stresses found at temperatures greater than 17-18°C for prolonged exposures (EPA 2002). Spawning and egg incubation temperatures were much lower with constant 4-12°C necessary for good survival.

The Green Peter Dam is on the Middle Santiam River about 30 miles southeast of Albany in Linn County, Oregon. Foster Dam is about 8 miles downstream of Green Peter, at RM 38 on the South Santiam River. The Middle Santiam River empties into the Foster Dam impoundment. Foster Dam reregulates hydropower releases from Green Peter Dam. Both dams have been in operation since 1968, and control runoff from a 227-square mile drainage area. In addition to power peaking, Green Peter Dam is also operated to ensure sufficient storage in Foster Lake to maintain steady flows downstream, including augmenting flows at Salem during low flow years. Fish passage facilities at Green Peter Dam have been mothballed since 1988, because of passage and survival problems. ODFW's South Santiam River Fish Hatchery was relocated and expanded to provide mitigation for loss of spawning grounds and rearing areas when the projects were completed in 1968 (USACE 2000).

Temperatures in the South Santiam River in the spring and early summer are presently cooler, and temperatures in the late summer and fall warmer, than the historic range. Foster Dam discharges water that is up to 7°C to 11°C cooler in the summer and up to 2°C to 3°C cooler in the fall (USACE 1988, cited in USACE 2000). The cooler temperatures could affect upstream migration of adult fish, and the warmer temperatures reduce survival of juveniles by accelerating emergence timing in the mainstem river, thereby potentially increasing fry exposure to adverse winter environmental conditions. The Willamette Project temperature and flow effects generally extend to the confluence of the Santiam River with the Willamette River, over a distance of approximately 40-60 miles. The South Santiam River basin as a whole was warmer historically than the North Santiam.

Due to withdrawals and other influences, the lower reach of the South Santiam River was 303(d)-listed for temperature in both time periods checked by ODEQ (2002). Their data showed that 41% of summer values exceeded the temperature standard (17.8°C), with exceedences annually and a maximum temperature of 21°C in water years 1986-1995.

The City of Albany currently receives water from the South Santiam River via the Albany-Santiam Canal. Albany holds two municipal use water rights on the South Santiam River totaling 50 cfs. One water right for 21 cfs has been perfected with a priority date of 1878, and the remaining 29 cfs permit with a priority date of 1979, has not been perfected. In addition to these municipal water rights, the City maintains a 275 cfs perfected water right from the South Santiam River for hydropower with a priority date of 1874. Based upon information from the 1988 Albany Water Master Plan, the state had issued a total of 385 cfs in water rights to Albany, Lebanon, and agricultural and industrial customers along the Canal.

The Federal Energy Regulatory Commission (FERC) issued the City of Albany a 50-year hydroelectric power license in October 1998, with conditions requiring fish passage improvements at the Diversion Dam and the installation of a fish screen at the entrance of the Canal. Following this, the City requested and obtained a project time extension in December, 2002 for up to three, two-year time extensions. The FERC license currently allows a maximum diversion of 190 cfs for power generation, with another 120 cfs diverted for non-power uses. The municipal and industrial uses also remove water from the Santiam River and ultimately release it into the Willamette or Calapooia River depending on whether it is treated or sewer system overflow. The FERC license limits withdrawal of water for hydropower use if the flow in the South Santiam River falls below 1,100 cfs. Mean daily flow in the South Santiam River is typically less than 1,100 cfs from about mid-June to mid-August. The peak municipal water demands are in July and August, so should not coincide with hydropower withdrawals because of the license restrictions (CH2M HILL 2003, Attachment 1). USGS records at the Waterloo Station on the South Santiam River show that 31% of daily average flows were less than 1,100 cfs from January 1, 1968, to September 30, 2001, while most flows over the year were between 600 cfs and 10,000 cfs (USGS 2003).

The mainstem Santiam at RM 11.2, near the project site is 303(d)-listed for temperature from September 15 - June 30, with 18 measurements greater than the spawning criteria of 12.8 C. It is also 303(d)-listed for dissolved oxygen, with 2 of 11 samples lower than the spawning criteria of 11 milligrams/liter and 95% saturation (ODEQ 2002).

2.1.3 Analysis of Effects

2.1.3.1 Effects of the Proposed Actions

The operation of the intake project will allow the water demand and treatment production to be shifted to the new plant. This will facilitate the work on the Albany-Santiam Canal improvement project by reducing the flows diverted into the canal during construction. This work is scheduled to begin design in 2004, with consultation for the Albany-Santiam Canal required improvements to follow.

Expanded supply

Water withdrawals for municipal use are consumptive from the Santiam River. The expanded supply will reduce flows in the mainstem Santiam River, although it will allow temporary increases in flows in the South Santiam River between the existing withdrawal point on the Albany-Santiam Canal and the new intake project. Projected withdrawals (Table 1) indicate that there will be demands on the existing plant when the initial capacity (2005) is inadequate. By 2015, from May through October, the initial capacity will be insufficient at times for peak withdrawals, and similarly by 2025, for average withdrawals. The point of diversion of the water right is initially shifting downstream to the new project, but in the future it will be switched back during peak months and emergencies providing only temporary benefits of the increased flows into the South Santiam River, which provides spawning habitat for both UWR chinook and steelhead (ODFW 2002). Overall diversions are projected to rise from an average

range of 10 to 20 cfs in 2005 to 12 to 23 cfs in 2015, and ultimately 27 to 54 cfs by 2075 (Table 1).

This consultation only covers the initial capacity improvements allowed by the new intake pumps. The full capacity projected withdrawals, which require diversions simultaneously from the South Santiam and the Santiam, have not been adequately characterized. The Albany-Santiam Canal screening, dam modifications, and operations will be analyzed in a separate consultation with Federal Energy Regulatory Commission (FERC) before any increased flow withdrawals occur. At that time, information about the effects on instream flows from increased withdrawals from the canal and the new intake operating simultaneously should be provided.

Draft flow objectives for the South and North Santiam Rivers are shown in Table 4. The COE's efforts to restore normative flows in the system, meet desired spring streamflow conditions in the Willamette River, and provide year round minimum protective flows in the tributaries while maintaining adequate Willamette River flows to protect water quality affect reservoir storage conditions and associated resources. The COE is working to define operations that would meet their multiple objectives while also satisfying other authorized project purposes.

Table 4. Draft Minimum Flow Objectives below Santiam River Basin COE Willamette River Projects, in Cubic Feet per Second. (Source: Chris Ross, NOAA Fisheries Hydro Program email to A. Mullan 9-16-03.)

Dam	Period	Primary Use	Minimum Flow (cfs)	Maximum Flow (cfs) [1]
Big Cliff (N. Santiam)	Sep 1 - Oct 15	chinook spawning	1,500	3,000
	Oct 16 - Jan 31	chinook incubation	1,200 [2]	
	Feb 1 - Mar 15	rearing	1,000	
	Mar 16 - May 31	steelhead spawning	1,500	3,000
	Jun 1 - Jul 15	steelhead incubation	1,200 [2]	
	Jul 16 - Aug 31	rearing	1,000	
Foster (S. Santiam)	Sep 1 - Oct 15	chinook spawning	1,500	3,000
	Oct 16 - Jan 31	chinook incubation	1,100 [2]	
	Feb 1 - Mar 15	rearing	800	
	Mar 16 - May 15	steelhead spawning	1,500	3,000
	May 16 - Jun 30	steelhead incubation	1,100 [2]	
	Jul 1 - Aug 31	rearing	800	

Notes:

1. Maximum flows are intended to minimize the potential for spawning to occur at stream elevations that might subsequently be dewatered at the specified minimum flow. It is recognized that these specified maxima may not always be achievable.
2. Incubation flows should be no less than ½ the maximum 24 hr. average discharge observed during the preceding spawning season. Efforts should be made to avoid prolonged releases in excess of the recommended maximum spawning season discharge

Intake and transmission structures

The intake and initial transmission pipeline are in areas of rearing habitat on the Santiam River, and given the proximity to the shoreline could affect the use of this area by juveniles. The screens are sized to allow sufficiently low approach velocities at projected initial pump capacity

withdrawal rates. The pipeline will be buried in the river bed material at a sufficient depth to prevent scour. Soil surface elevations will be returned to original grades, and native topsoil will be reinstalled on top of the trench backfill. The effects from these actions should be minimal because of work area isolation.

Other sections of the transmission system cross several creeks (Table 2). These crossings will potentially disrupt the use by rearing or migrating juveniles if they are present during the work period, particularly in Crooks Creek. In all other cases the effects should be minimal due to the use of bored crossings or placement in existing culverts.

The gravel bar may be disturbed in the area surrounding the intake structure. Construction actions that add fine sediment to channels, or disturb shallow-water habitats can adversely affect the ability of salmon and steelhead to obtain food necessary for growth and maintenance. Salmon and steelhead are generally able to avoid the adverse conditions created by construction if those conditions are limited to areas that are small or local compared to the total habitat area, and if the system can recover before the next disturbance. This means juvenile and adult salmon and steelhead will, to the extent possible, readily move out of a construction area to obtain a more favorable position within their range of tolerance along a complex gradient of temperature, turbidity, flow, noise, contaminants, and other environmental features.

The degree and effectiveness of the avoidance response varies with life stage, season and the frequency and duration of exposure to the unfavorable condition, and the ability of the individual to balance other behavioral needs for feeding, growth, migration, and territory. Chronic or unavoidable exposure heightens physiological stress thus increasing maintenance energy demands (Redding *et al*. 1987, Servizi and Martens 1991). This reduces the feeding and growth rates of juveniles and can interfere with juvenile migration, growth to maturity, and adult migration. Due to the expected low numbers of fish in the area during the limited time period that the isolation is required, the environmental changes caused should be negligible.

2.1.3.2 Cumulative Effects

Cumulative effects are defined in 50 CFR 402.02 as "those effects of future State or private activities, not involving Federal activities, that are reasonably certain to occur within the action area of the Federal action subject to consultation". Other activities within the watershed have the potential to impact fish and habitat within the action area. Future Federal actions, including the ongoing operation of hydropower systems, hatcheries, fisheries, and land management activities are being (or have been) reviewed through separate section 7 consultation processes.

The additive effects of removals downstream of the reservoirs are not addressed in a cumulative manner, as withdrawal projections are provided by individual entities (municipalities, water control districts, *etc.*). This creates a potential for overallocation to occur downstream at various points when increasing withdrawal rights are exercised. As this project is low in the Santiam River system, it is possible that a substantial portion of the flow objectives for the COE projects would not make it to this point during low flow conditions. Under such conditions, additional

withdrawals can reduce wetted areas and increase temperatures. This may create barriers to migrating juveniles or adults, particularly spring chinook, as adults return during July and August, overlapping with peak municipal and irrigation withdrawals and the lowest flow periods.

Non-federal activities within the action area are expected to increase with a projected 34% increase in human population over the next 25 years in Oregon (Oregon Department of Administrative Services 1999). Thus, NOAA Fisheries assumes that future private and state actions will continue within the action area, but at increasingly higher levels as population density climbs. The housing units in Albany have increased between 1990 and 2000, from 12,327 to 17,389, while Millersburg housing units have declined slightly from 288 to 285 in the same time period (Oregon Economic and Community Development Department 2003). At 90 gallons/day estimated water use for 1990 and earlier housing units, and 70 gallons/day for newer units (personal communication, telephone conversation Bill Fuji, Oregon Water Resources Board and A. Mullan, September 15, 2003), the total household usage is 1.49 million gallons/day or 2.3 cfs. The bulk of the remaining demand projected for the new intake must be for industrial and other uses, and the rate at which demand will increase is not known.

2.1.4 Conclusion

NOAA Fisheries has determined, based on the available information, that the proposed action covered in this Opinion is not likely to jeopardize the continued existence of listed salmonids. NOAA Fisheries used the best available scientific and commercial data to apply its jeopardy analysis, analyzing the effects of the proposed action on the biological requirements of the species relative to the environmental baseline, together with cumulative effects. The level of direct mortality is expected to be minimal and would not result in jeopardy.

These conclusions are based on the following considerations: (1) Construction staging impacts will be limited to existing roads to avoid impact to wetlands and habitat and any increases in sedimentation and turbidity to the Santiam River will be short-term and minimized by best management practices including work area isolation; (2) the intake screens will be maintained and operated to reduce the effects on juvenile salmonids; (3) there will not be increases in withdrawals above existing capacity without a separate consultation on the effects of the increase; (4) the South Santiam River flow levels will be enhanced when the point of diversion for the Albany water supply is moved to the new intake on the Santiam River; and (5) the proposed action is not likely to impair properly functioning habitat, appreciably reduce the functioning of already impaired habitat, or retard the long-term progress of impaired habitat toward proper functioning condition essential to the long-term survival and recovery at the population or ESU scale.

2.1.5 Conservation Recommendations

Section 7 (a)(1) of the ESA directs Federal agencies to use their authorities to further the purposes of the ESA by carrying out conservation programs for the benefit of the threatened and endangered species. Conservation recommendations are discretionary measures suggested to

minimize or avoid adverse effects of proposed actions on listed species, to minimize or avoid adverse modification of critical habitat, or to develop additional information. NOAA Fisheries believes the following conservation recommendations are consistent with these obligations, and therefore should be carried out by the COE:

1. Produce a water management plan which addresses flows required for passage, rearing, and spawning for the South and mainstem Santiam Rivers' cumulative diversions.

2. Include in the plan of operation for the Big Cliff and Detroit dams sufficient flows under low flow conditions during spring chinook migration, so that the a minimum of 25% stream width will be available for passage as determined in future studies, using the instream flow incremental method (IFIM) method or another comparable analysis.

3. Work with the permit applicant to identify ways to help achieve minimum flow objectives for the Santiam River basin.

For NOAA Fisheries to be kept informed of actions minimizing or avoiding adverse effects, or those that benefit listed salmon and steelhead or their habitats, we request notification of the achievement of any conservation recommendations when the COE submits its annual report describing achievements of the fish monitoring program during the previous year.

2.1.6 Reinitiation of Consultation

Reinitiation of consultation is required if: (1) The amount or extent of incidental take is exceeded; (2) new information or project monitoring reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this Opinion; (3) the agency action is subsequently modified in a manner that causes an effect to the listed species or critical habitat not considered in this Opinion; or (4) a new species is listed or critical habitat is designated that may be affected by the action (50 CFR 402.16).

If the applicant fails to provide specified monitoring information by the required date, NOAA Fisheries will consider that a modification of the action, that causes an effect on listed species not previously considered. Also, if water withdrawals exceed the 2005 levels (Table 1), consultation needs to be reinitiated. Similarly, if the section 7 consultation with FERC on the canal improvements does not address instream flows in the South Santiam River, NOAA Fisheries will consider this to be new information about an effect not previously considered. If any of these occur, the incidental take statement of this Opinion will expire.

2.2 Incidental Take Statement

The ESA at section 9 [16 USC 1538] prohibits take of endangered species. The prohibition of take is extended to threatened anadromous salmonids by section 4(d) rule [50 CFR 223.203]. Take is defined by the statute as "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture,

or collect, or to attempt to engage in any such conduct." [16 USC 1532(19)] Harm is defined by regulation as "an act which actually kills or injures fish or wildlife. Such an act may include significant habitat modification or degradation which actually kills or injures fish or wildlife by significantly impairing essential behavior patterns, including, breeding, spawning, rearing, migrating, feeding or sheltering." [50 CFR 222.102] Harass is defined as "an intentional or negligent act or omission which creates the likelihood of injury to wildlife by annoying it to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding, or sheltering." [50 CFR 17.3] Incidental take is defined as "takings that result from, but are not the purpose of, carrying out an otherwise lawful activity conducted by the Federal agency or applicant." [50 CFR 402.02] The ESA at section 7(o)(2) removes the prohibition from any incidental taking that is in compliance with the terms and conditions specified in a section 7(b)(4) incidental take statement [16 USC 1536].

An incidental take statement specifies the impact of any incidental taking of threatened species. It also provides reasonable and prudent measures that are necessary to minimize impacts and sets forth terms and conditions with which the action agency must comply to implement the reasonable and prudent measures.

2.2.1 Amount and Extent of the Take

NOAA Fisheries anticipates that activities associated with the intake project are reasonably certain to result in incidental take of ESA-listed salmonids because of potential adverse effects from reduced flows, increased temperatures, and local turbidity from construction activities and creek crossings, and due to channel changes from screen structure placement and trenching.

Therefore, even though NOAA Fisheries expects some low level of incidental take to occur due to the action covered by this Opinion, the best scientific and commercial data available are not sufficient to enable NOAA Fisheries to estimate a specific amount of incidental take to the species itself. In instances such as this, NOAA Fisheries designates the expected level of take as unquantifiable. In the accompanying Opinion, NOAA Fisheries determined that this level of anticipated take is not likely to result in jeopardy to the species. The extent of the take is limited to UWR steelhead and chinook salmon in the Santiam River and to the associated riparian and aquatic habitats in the action area as defined in section 1.3 of this Opinion.

2.2.2 Reasonable and Prudent Measures

NOAA Fisheries believes that the following reasonable and prudent measures are necessary and appropriate to avoid or minimize take of listed salmonid species resulting from the action covered by this Opinion. The COE shall include measures that will:

1. Avoid or minimize the likelihood of incidental take associated with general construction of the intake and transmission structures, by ensuring fish passage around the project during construction and avoiding or minimize disturbance to riparian and aquatic systems.

2. Avoid or minimize the likelihood of incidental take associated with intake screen and bypass operations by ensuring that the facilities allow upstream and downstream movement of adult and juvenile fish around the project.

3. Ensure completion of a comprehensive monitoring and reporting program to confirm this Opinion is meeting its objective of minimizing take from permitted activities.

2.2.3 Terms and Conditions

To be exempt from the prohibitions of section 9 of the ESA, the COE and/or their contractors must comply with the following terms and conditions, which implement the reasonable and prudent measures described above. These terms and conditions are non-discretionary.

1. To implement reasonable and prudent measure #1 (general construction of the intake and transmission structures), the COE shall ensure that:

    a. Timing of in-water work. Work below ordinary high water will be completed between June 1- September 30, unless approved in writing by NOAA Fisheries.
    b. Cessation of work. Project operations will cease under high flow conditions that may result in inundation of the project area, except for efforts to avoid or minimize resource damage.
    c. Fish passage. Passage will be provided for any adult or juvenile salmon or steelhead present in the project area during construction, and after construction for the life of the project.
    d. Fish screens. All water intakes used for a project, including pumps used to isolate an in-water work area, will have a fish screen installed, operated and maintained according to NOAA Fisheries' fish screen criteria.[4]
    e. Pollution and Erosion Control Plan. A pollution and erosion control plan will be prepared and carried out to prevent pollution related to construction operations. The plan must be available for inspection on request by COE or NOAA Fisheries.
        i. Plan Contents. The pollution and erosion control plan must contain the pertinent elements listed below, and meet requirements of all applicable laws and regulations.
            (1) Practices to prevent erosion and sedimentation associated with access roads, stream crossings, construction sites, borrow pit operations, haul roads, equipment and material storage sites, fueling operations and staging areas.

[4] National Marine Fisheries Service, *Juvenile Fish Screen Criteria* (revised February 16, 1995) and *Addendum: Juvenile Fish Screen Criteria for Pump Intakes* (May 9, 1996) (guidelines and criteria for migrant fish passage facilities, and new pump intakes and existing inadequate pump intake screens) (http://www.nwr.noaa.gov/1hydrop/hydroweb/ferc.htm).

(2) Practices to confine, remove and dispose of excess concrete, cement and other mortars or bonding agents, including measures for washout facilities.

(3) A description of any hazardous products or materials that will be used for the project, including procedures for inventory, storage, handling, and monitoring.

(4) A spill containment and control plan with notification procedures, specific clean up and disposal instructions for different products, quick response containment and clean up measures that will be available on the site, proposed methods for disposal of spilled materials, and employee training for spill containment.

(5) Practices to prevent construction debris from dropping into any stream or waterbody, and to remove any material that does drop with a minimum disturbance to the streambed and water quality.

ii. Inspection of erosion controls. During construction, all erosion controls must be inspected daily during the rainy season and weekly during the dry season to ensure they are working adequately.[5]

(1) If inspection shows that the erosion controls are ineffective, work crews must be mobilized immediately to make repairs, install replacements, or install additional controls as necessary.

(2) Sediment must be removed from erosion controls once it has reached 1/3 of the exposed height of the control.

f. Construction discharge water. All discharge water created by construction (*e.g.*, concrete washout, pumping for work area isolation, vehicle wash water) will be treated as follows:

i. Water quality. Facilities must be designed, built and maintained to collect and treat all construction discharge water using the best available technology applicable to site conditions. The treatment must remove debris, nutrients, sediment, petroleum hydrocarbons, metals and other pollutants likely to be present.

ii. Discharge velocity. If construction discharge water is released using an outfall or diffuser port, velocities must not exceed 4 feet per second.

iii. Spawning areas. No construction discharge water may be released within 300 feet upstream of active spawning areas.

g. Preconstruction activity. Before significant [6] alteration of the project area, the following actions must be completed:

i. Marking. Flag the boundaries of clearing limits associated with site access and construction to prevent ground disturbance of critical riparian vegetation, wetlands and other sensitive sites beyond the flagged boundary.

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[5] "Working adequately" means no turbidity plumes are evident during any part of the year.

[6] "Significant" means an effect can be meaningfully measured, detected or evaluated.

ii. Emergency erosion controls. Ensure that the following materials for emergency erosion control are onsite.

(1) A supply of sediment control materials (*e.g.*, silt fences, straw bales).[7]

(2) An oil-absorbing, floating boom whenever surface water is present.

iii. Temporary erosion controls. All temporary erosion controls must be in-place and appropriately installed downslope of project activity within the riparian area until site restoration is complete.

h. Temporary access roads.

i. Existing ways. Existing roadways or travel paths must be used whenever possible, unless construction of a new way would result in less habitat take.

ii. Minimizing soil disturbance and compaction. When a new temporary road is necessary within 150 feet [8] of a stream, waterbody or wetland, soil disturbance and compaction must be minimized by clearing vegetation to ground level and placing clean gravel over geotextile fabric, unless otherwise approved in writing by NOAA Fisheries.

iii. Obliteration. When the project is completed, all temporary access roads must be obliterated, the soil must be stabilized, and the site must be revegetated. Temporary roads in wet or flooded areas must be abandoned and restored as necessary by the end of the in-water work period.

i. Heavy Equipment. Use of heavy equipment will be restricted as follows:

i. Choice of equipment. When heavy equipment must be used, the equipment selected must have the least adverse effects on the environment (*e.g.*, minimally-sized, rubber-tired).

ii. Vehicle staging. Vehicles must be fueled, operated, maintained and stored as follows:

(1) Vehicle staging, cleaning, maintenance, refueling, and fuel storage must take place in a vehicle staging area placed 150 feet or more from any stream, water body or wetland.

(2) All vehicles operated within 150 feet of any stream, water body or wetland must be inspected daily for fluid leaks before leaving the vehicle staging area. Any leaks detected must be repaired in the vehicle staging area before the vehicle resumes operation.

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[7] When available, certified weed-free straw or hay bales must be used to prevent introduction of noxious weeds.

[8] Distances from a stream or water body are measured horizontally from, and perpendicular to, the bankfull elevation, the edge of the channel migration zone, or the edge of any associated wetland, whichever is greater. "Channel migration zone" means the area defined by the lateral extent of likely movement along a stream reach as shown by evidence of active stream channel movement over the past 100 years, e.g., alluvial fans or floodplains formed where the channel gradient decreases, the valley abruptly widens, or at the confluence of larger streams.

Inspections must be documented in a record that is available for review on request by COE or NOAA Fisheries.

(3) All equipment operated instream must be cleaned before beginning operations below the bankfull elevation to remove all external oil, grease, dirt, and mud.

iii. Stationary power equipment. Stationary power equipment (*e.g.*, generators, cranes) operated within 150 feet of any stream, water body or wetland must be diapered to prevent leaks, unless otherwise approved in writing by NOAA Fisheries.

j. Site preparation. Native materials will be conserved for site restoration.

i. If possible, native materials must be left where they are found.

ii. Materials that are moved, damaged or destroyed must be replaced with a functional equivalent during site restoration.

iii. Any large wood [9], native vegetation, weed-free topsoil, and native channel material displaced by construction must be stockpiled for use during site restoration.

k. Isolation of in-water work area. If adult or juvenile fish are reasonably certain to be present, the work area will be well isolated from the active flowing stream using inflatable bags, sandbags, sheet pilings, or similar materials. The work area will also be isolated if in-water work may occur within 300 feet upstream of spawning habitats.

l. Capture and release. Before and intermittently during pumping to isolate an in-water work area, an attempt must be made to capture and release fish from the isolated area using trapping, seining, electrofishing, or other methods as are prudent to minimize risk of injury.

i. A fishery biologist experienced with work area isolation and competent to ensure the safe handling of all ESA-listed fish must conduct or supervise the entire capture and release operation.

ii. If electrofishing equipment is used to capture fish, the capture team must comply with NOAA Fisheries' electrofishing guidelines.[10]

iii. The capture team must handle ESA-listed fish with extreme care, keeping fish in water to the maximum extent possible during seining and transfer procedures to prevent the added stress of out-of-water handling.

iv. Captured fish must be released as near as possible to capture sites.

v. ESA-listed fish may not be transferred to anyone except NOAA Fisheries personnel, unless otherwise approved in writing by NOAA Fisheries.

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[9] For purposes of this Opinion only, "large wood" means a tree, log, or rootwad big enough to dissipate stream energy associated with high flows, capture bedload, stabilize streambanks, influence channel characteristics, and otherwise support aquatic habitat function, given the slope and bankfull width of the stream in which the wood occurs. See, Oregon Department of Forestry and Oregon Department of Fish and Wildlife, *A Guide to Placing Large Wood in Streams*, May 1995 (www.odf.state.or.us/FP/RefLibrary/LargeWoodPlacemntGuide5-95.doc).

[10] National Marine Fisheries Service, *Backpack Electrofishing Guidelines* (December 1998) (http://www.nwr.noaa.gov/1salmon/salmesa/pubs/electrog.pdf).

vi. Other Federal, state, and local permits necessary to conduct the capture and release activity must be obtained.

vii. NOAA Fisheries or its designated representative must be allowed to accompany the capture team during the capture and release activity, and must be allowed to inspect the team's capture and release records and facilities.

m. Earthwork. Earthwork (including drilling, excavation, dredging, filling and compacting) will be completed as quickly as possible.

i. Site stabilization. All disturbed areas must be stabilized, including obliteration of temporary roads, within 12 hours of any break in work unless construction will resume work within 7 days between June 1 and September 30, or within 2 days between October 1 and May 31.

ii. Source of materials. Boulders, rock, woody materials and other natural construction materials used for the project must be obtained outside the riparian area.

(1) Any erodible elements of this system must be adequately stabilized to prevent erosion.

(2) Surface water from the area must not be diverted from or increased to an existing wetland, stream or near-shore habitat sufficient to cause a significant adverse effect to wetland hydrology, soils or vegetation.

n. Site restoration. All streambanks, soils and vegetation disturbed by the project are cleaned up and restored as follows:

i. Restoration goal. The goal of site restoration is renewal of habitat access, water quality, production of habitat elements (such as large woody debris), channel conditions, flows, watershed conditions and other ecosystem processes that form and maintain productive fish habitats.

ii. Streambank shaping. Damaged streambanks must be restored to a natural slope, pattern and profile suitable for establishment of permanent woody vegetation.

iii. Revegetation. Areas requiring revegetation must be replanted before the first April 15 following construction with a diverse assemblage of species that are native to the project area or region, including grasses, forbs, shrubs and trees.

iv. Pesticides. No pesticide application is allowed, although mechanical or other methods may be used to control weeds and unwanted vegetation.

v. Fertilizer. No surface application of fertilizer may occur within 50 feet of any stream channel.

vi. Fencing. Fencing must be installed as necessary to prevent access to revegetated sites by livestock or unauthorized persons.

2. To implement reasonable and prudent measure #2 (intake screen operations), the COE will ensure that the applicant will design, install and operate the intake facilities as follows:

a. Screen design. The intake screens will be installed, operated and maintained according to NOAA Fisheries' fish screen criteria.[11]
   i. Ensure even velocity distribution when in the screening mode, and even air distribution when in the cleaning mode.
   ii. The system shall be capable of initiating backwashing based on a programmable timer to ensure that the screens are cleaned by means of a pressurized air burst system. The air burst compressor and air receiver mounted in the raw water pump station building will receive regular preventive maintenance as a part of the city's preventive maintenance program.
   iii. The screens will be inspected annually or more frequently at low river flow conditions. Periodic removal of organic material or any debris on the screens will be performed at these inspection times.

b. Minimal diversions. The Albany-Millersburg Joint Water Supply Intake Project shall limit diversions from the Santiam River to those shown in section 1.2.1, Table 1, for 2005, specifically excluding any expanded diversions into the Albany-Santiam Canal for the Albany Hydroelectric Project, or simultaneous diversions from the canal and the new intake, before canal improvements and consultation. These diversions must be the topic of a separate consultation.

c. Educational notice: status of ESA species in the Santiam River and the need for water conservation. Provide written notification to every owner or occupant of property served by the works of the intake project, and from which the operator collects any user charge, fee or toll for use of its works, of the following information as part of a special mailing, a feature article in a periodic newsletter, or such other manner that the intake project operator deems appropriate.
   i. Adult and/or juvenile UWR chinook salmon and UWR steelhead are or may be present in the project area year round.
   ii. These species are listed as threatened under the ESA.
   iii. Adults and juveniles of these species should be avoided and protected, and require minimum instream flows to successfully complete behaviors such as migration, spawning and rearing that are necessary for their long-term survival and recovery.
   iv. The lack of necessary instream flows may result in a variety of adverse biological effects including direct mortality, delayed migration, reduced spawning, loss of preferred food resources for rearing, reduced growth, altered competitive relationships, reduced populations, and decreased productivity.

[11] National Marine Fisheries Service, *Juvenile Fish Screen Criteria* (revised February 16, 1995) and *Addendum: Juvenile Fish Screen Criteria for Pump Intakes* (May 9, 1996) (guidelines and criteria for migrant fish passage facilities, and new pump intakes and existing inadequate pump intake screens) (http://www.nwr.noaa.gov/1hydrop/hydroweb/ferc.htm).

v. Therefore, all users served by the intake project are encouraged to eliminate waste and be as efficient as possible in their use of water, including their technology or method of diverting, transporting, applying and recovering water; by changing management of water use; and by applying specific conservation measures such as eliminating system leakage, low water use landscaping, metering, and use of high-efficiency plumbing fixtures.

d. Educational sign: status of ESA species in the Santiam River and the need for water conservation. Post the same educational information outlined above on permanent signs placed and maintained in the vicinity of the intake area, or as near as is appropriate, to notify contractors, or other members of the public who may be in the area.

3. To implement reasonable and prudent measure #3 (monitoring and reporting), the COE will ensure that the applicant completes the following tasks.

a. Construction monitoring. Ensure that the applicant submits a monitoring report to the COE and to NOAA Fisheries within 120 days of project completion describing success meeting the construction terms and conditions for the fish screen and tailrace barrier. The construction monitoring report will include the following information:

i. Project identification
   (1) Permittee name, consultation number, and project name;
   (2) contact person for project construction; and
   (3) starting and ending dates for work completed.

ii. Narrative assessment. A narrative assessment of the project's effects on natural stream function.

iii. Photo documentation. Photographs of habitat conditions at the project before, during, and after project completion[12]. Include general views and close-ups showing details of the project and project area, including pre and post construction. Label each photo with date, time, project name, photographer's name, and a comment about the subject.

iv. Work cessation. Dates work cessation was required due to high flows.

v. Fish screen. Compliance with NOAA Fisheries' fish screen criteria.

vi. Pollution and erosion control. A summary of pollution and erosion control inspections, including any erosion control failure, hazardous material spill, and correction effort.

vii. Site preparation. Total cleared area – riparian and upland.

viii. Isolation of in-water work area, capture and release.
   (1) Supervisory fish biologist – name and address.

[12] Relevant habitat conditions may include characteristics of channels, eroding and stable streambanks in the project area, riparian vegetation, water quality, flows at base, bankfull and over-bankfull stages, and other visually discernable environmental conditions at the project area, and upstream and downstream of the project.

(2) Methods of work area isolation and take minimization.
(3) Stream conditions before, during and within one week after completion of work area isolation.
(4) Means of fish capture.
(5) Number of fish captured by species.
(6) Location and condition of all fish released.
(7) Any incidence of observed injury or mortality.

ix. Site restoration.
(1) Finished grade slopes and elevations.
(2) Log and rock structure elevations, orientation, and anchoring (if any).
(3) Planting composition and density.
(4) A five-year plan to: Inspect and, if necessary, replace failed plantings to achieve 100% survival at the end of the first year, and 80% survival or 80% coverage after five years (including both plantings and natural recruitment).
(a) Control invasive non-native vegetation.
(b) Protect plantings from wildlife damage and other harm.

b. Hydraulic evaluation report. A description of the fish screen test performance for approach and sweeping velocities as follows:
i. Use an initial screen performance test to measure approach and sweeping velocities for compliance with NOAA Fisheries criteria.The sweeping velocity, measured parallel to and in front of the screen faces should equal or exceed the approach velocity, and should not decelerate anywhere along the screen face.
ii. Once adjusted, the applicant will conduct a final hydraulic evaluation, measuring the approach and sweeping velocities under the maximum withdrawal rate to verify functionality.

c. Annual operations monitoring report. Ensure that the applicant submits an annual operations monitoring report to the COE and to NOAA Fisheries by January 31 of each year until 2008, describing its success meeting the operations terms and conditions for the fish screens. The operations monitoring report will include the following information:
i. Flow measurement. Weekly average and maximum instantaneous withdrawals measured in cubic feet per second, between March 1 and October 31, at the new joint water intake.
ii. Site and channel restoration.
(1) A summary of site restoration plant inspections, and replantings and non-native vegetation control efforts (if any).
(2) Photographic documentation of environmental conditions at the channel restoration sites.
iii. Reporting address. Submit a copy of the construction, hydraulic evaluation, and annual operating reports to the following address:

Oregon State Director- Portland
NOAA Fisheries
Attn: 2002/01193
525 NE Oregon Street
Portland, OR 97232

iv. Reinitiation. The COE shall reinitiate formal consultation on this Opinion if either of the following conditions occurs:
(1) Water withdrawals are modified beyond the 2005 levels (Table 1).
(2) Section 7 consultation with FERC on canal improvements does not address instream flows on the South Santiam River.

v. Salvage notice. If a dead, injured, or sick endangered or threatened species specimen is found, initial notification must be made to the NOAA Fisheries Law Enforcement Office, Vancouver Field Office, 600 Maritime, Suite 130, Vancouver, Washington 98661; phone: 360.418.4246. Care will be taken in handling sick or injured specimens to ensure effective treatment and care or the handling of dead specimens to preserve biological material in the best possible state for later analysis of cause of death. In conjunction with the care of sick or injured endangered and threatened species or preservation of biological materials from a dead animal, the finder has the responsibility to carry out instructions provided by Law Enforcement to ensure that evidence intrinsic to the specimen is not unnecessarily disturbed.

3. MAGNUSON-STEVENS ACT

The objective of the essential fish habitat (EFH) consultation is to determine whether the proposed actions may adversely affect designated EFH for relevant species, and to recommend conservation measures to avoid, minimize, or otherwise offset potential adverse effects to EFH resulting from the proposed action.

3.1 Magnuson-Stevens Fishery Management and Conservation Act

The MSA, as amended by the Sustainable Fisheries Act of 1996 (Public Law 104-267), requires the inclusion of EFH descriptions in Federal fishery management plans. In addition, the MSA requires Federal agencies to consult with NOAA Fisheries on activities that may adversely affect EFH.

EFH means those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity (MSA §3). For the purpose of interpreting the definition of essential fish habitat: "Waters" include aquatic areas and their associated physical, chemical, and biological properties that are used by fish and may include aquatic areas historically used by fish where appropriate; "substrate" includes sediment, hard bottom, structures underlying the waters, and

associated biological communities; "necessary" means the habitat required to support a sustainable fishery and the managed species' contribution to a healthy ecosystem; and "spawning, breeding, feeding, or growth to maturity" covers a species' full life cycle (50 CFR 600.110).

Section 305(b) of the MSA (16 U.S.C. 1855(b)) requires that:

- Federal agencies must consult with NOAA Fisheries on all actions, or proposed actions, authorized, funded, or undertaken by the agency, that may adversely affect EFH;

- NOAA Fisheries shall provide conservation recommendations for any Federal or state activity that may adversely affect EFH;

- Federal agencies shall within 30 days after receiving conservation recommendations from NOAA Fisheries provide a detailed response in writing to NOAA Fisheries regarding the conservation recommendations. The response shall include a description of measures proposed by the agency for avoiding, mitigating, or offsetting the impact of the activity on EFH. In the case of a response that is inconsistent with the conservation recommendations of NOAA Fisheries, the Federal agency shall explain its reasons for not following the recommendations.

The MSA requires consultation for all actions that may adversely affect EFH, and does not distinguish between actions within EFH and actions outside EFH. Any reasonable attempt to encourage the conservation of EFH must take into account actions that occur outside EFH, such as upstream and upslope activities, that may have an adverse effect on EFH. Therefore, EFH consultation with NOAA Fisheries is required by Federal agencies undertaking, permitting or funding activities that may adversely affect EFH, regardless of its location.

3.2 Identification of EFH

The Pacific Fisheries Management Council (PFMC) has designated EFH for Federally-managed fisheries within the waters of Washington, Oregon, and California. Freshwater EFH for Pacific salmon includes all those streams, lakes, ponds, wetlands, and other water bodies currently, or historically accessible to salmon in Washington, Oregon, Idaho, and California, except areas upstream of certain impassable man-made barriers (as identified by the PFMC), and longstanding, naturally-impassable barriers (*i.e.*, natural waterfalls in existence for several hundred years) (PFMC 1999).

Detailed descriptions and identifications of EFH for salmon are found in Appendix A to Amendment 14 to the *Pacific Coast Salmon Plan* (PFMC 1999). Assessment of the potential adverse effects to these species' EFH from the proposed action is based on this information.

The Pacific Fisheries Management Council (PFMC) has designated EFH for three species of Pacific salmon: Chinook (*Oncorhynchus tshawytscha*), coho (*O. kisutch*), and Puget Sound pink

salmon (*O. gorbuscha*) (PFMC 1999). Freshwater EFH for Pacific salmon includes all those streams, lakes, ponds, wetlands, and other waterbodies currently, or historically accessible to salmon in Washington, Oregon, Idaho, and California, except areas upstream of certain impassable man-made barriers (as identified by the PFMC), and longstanding, naturally-impassable barriers (*i.e.*, natural waterfalls in existence for several hundred years). Detailed descriptions and identifications of EFH for salmon are found in Appendix A to Amendment 14 to the *Pacific Coast Salmon Plan* (PFMC 1999). Assessment of potential adverse effects to these species' EFH from the proposed action is based on this information.

3.3 Proposed Action

The proposed action is detailed above in section 1.2. The action area for this consultation includes the bankline, riparian area, and aquatic habitat in the vicinity of the proposed intake on the Santiam River, and the instream wetted area downstream from the proposed intake to the confluence with the Willamette River. This area has been designated as EFH for chinook and coho salmon.

3.4 Effects of Proposed Action

As described in detail in section 2.1.3.1 of this Opinion, the proposed action may result in adverse effects to water quality (sediment and temperature) and quantity. NOAA Fisheries believes the implementation of the project is likely to adversely affect EFH for chinook and coho salmon. NOAA Fisheries also believes that providing fish passage and the conservation measures proposed as an integral part of the action would avoid, minimize, or otherwise offset potential adverse impacts to designated EFH.

3.5 Conclusion

NOAA Fisheries believes that implementation of the intake project in the Santiam River will adversely affect designated EFH for chinook and coho salmon.

3.6 EFH Conservation Recommendations

Pursuant to section 305(b)(4)(A) of the MSA, NOAA Fisheries is required to provide EFH conservation recommendations for any Federal or state agency action that would adversely affect EFH. The conservation measures proposed for the project by the applicant and by NOAA Fisheries, all of the reasonable and prudent measures and the terms and conditions contained in section 2.2.3 are applicable to chinook and coho salmon EFH. Therefore, NOAA Fisheries incorporates each of those measures here as EFH conservation recommendations.

3.7 Statutory Response Requirement

Please note that the MSA (section 305(b)) and 50 CFR 600.920(j) requires the Federal agency to provide a written response to NOAA Fisheries after receiving EFH conservation

recommendations within 30 days of its receipt of this letter. This response must include a description of measures proposed by the agency to avoid, minimize, mitigate or offset the adverse impacts of the activity on EFH. If the response is inconsistent with a conservation recommendation from NOAA Fisheries, the agency must explain its reasons for not following the recommendation.

3.8 Supplemental Consultation

The COE must reinitiate EFH consultation with NOAA Fisheries if either the action is substantially revised or new information becomes available that affects the basis for NOAA Fisheries' EFH conservation recommendations (50 CFR 600.920).

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